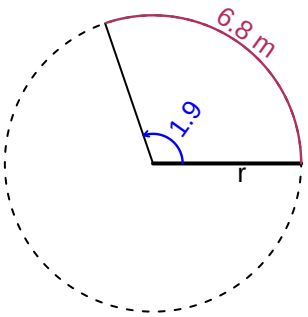
Name: Date:

Trig Final (SLTN v637)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.9 radians. The arc length is 6.8 meters. How long is the radius in meters?

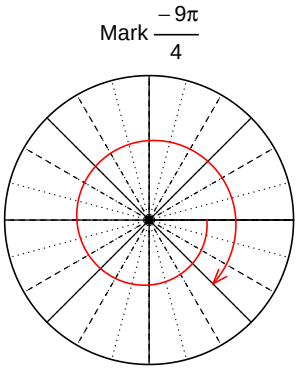


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

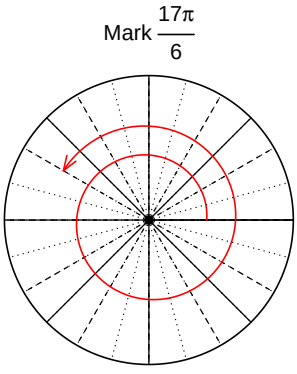
$r = 3.579$ meters.

Question 2

Consider angles $\frac{-9\pi}{4}$ and $\frac{17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-9\pi}{4}\right)$ and $\sin\left(\frac{17\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(-9\pi/4)$



Find $\sin(17\pi/6)$

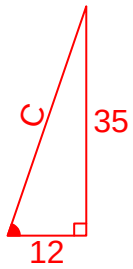
$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(17\pi/6) = \frac{1}{2}$

Question 3

If $\tan(\theta) = \frac{35}{12}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.

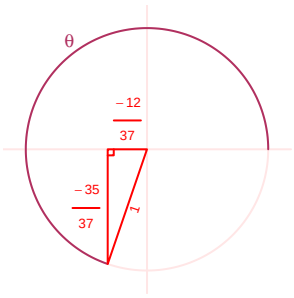
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$12^2 + 35^2 = C^2$$
$$C = \sqrt{12^2 + 35^2}$$
$$C = 37$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-35}{37}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -8.97$ meters, a frequency of 3.91 Hz, and an amplitude of 7.62 meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.62\cos(2\pi 3.91t) - 8.97$$

or

$$y = 7.62\cos(7.82\pi t) - 8.97$$

or

$$y = 7.62\cos(24.57t) - 8.97$$